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FAMILY LYCEUM.

JOSIAH HOLBROOK, EDITOR.

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THE ARTS.

Continued from Lyceum No. 5.

GLASS.

THE Latin writers of the Augustan age make frequent mention of glass. Virgil compares to it the clearness of the water in the Fucine Lake (Æn. vii. 759.) and Horace speaks of the lustre and transparency of glass in a way which shows that it could then be made with a considerable degree of perfection. In the year 220 a tax was laid by Alexander Severus upon the glass manufacturers of Rome, who at this time existed in such numbers, that a principal quarter was assigned to them in that city, wherein they might carry on their processes. This tax was still levied in the reign of Aurelian.

The most celebrated specimen of antique glass is the vase, which during more than two centuries ornamented the Barberina palace, and which, having been subsequently purchased by the late duchess of Portland, is better known in this country as the Portland vase. This much-admired production was found about the middle of the sixteenth century, inclosed in a marble sarcophagus, and deposited in the tomb of Alexander Severus, who died in the year 235. The body of this vase, which for a long time was erroneously supposed to be formed of porcelain, is made of deep blue glass, and is ornamented with white opaqe figures in bas-relief, which are designed and sculptured in the style of cameos with a degree of skill which is truly admirable.

Glass melted and cast into plates, is said by St. Jerome to have been used in his time (A. D. 422,) to form windows. About a century later, Paulus Silentiarius mentions the windows of the church of St. Sophia at Constantinople, which were covered with glass; and from this period frequent allusions to the similar use of glass are met with in various authors.

Long before the establishment of the manufacture within this island, glass was known and used in England. The Venetians who traded with this country in very remote times furnished this among other articles of commerce in exchange for tin. The erudite Pennant is of opinion, that glass-making in Britain dates prior to the Roman invasion. The Druids were accustomed to impose upon their more ignorant followers by means of clumsily-formed beads of colored glass, which they pretended were endued with the quality of guarding their possessors from evil.

The venerable Bede, who lived very near the time, and who therefore had good opportunities for ascertaining the fact, has asserted in his history of Weremouth, that in the year 664 the abbot Benedict sent for artists from beyond seas to glaze the windows of the church and monastery of Weremouth in Durham, and that these men were our first instructers in the art of making window-glass. This art, however, took root but slowly among us; and it was not until the eleventh century that glass windows were at all commonly used, either in private dwellings or in public and religious edifices. Previously to this time, light was imperfectly transmitted through linen cloths or wooden lattices. The houses of the commoner people were not, indeed, furnished with this luxury until the thirteenth and fourteenth centuries, in which respect our ancestors were greatly behind the inhabitants of Italy and France.

The following curious entry, extracted from the Northumberland household book, makes it apparent that at a much later period than the one just mentioned, the comfort of glazed windows was not considered as a matter of course even in establishments where great state and magnificence were maintained. This entry occurs in the minutes of a survey of Alnwick Castle made in the year 1567:—

'And because throwe extream windes the glasses of the windowes of this and other my lords castels and houses here in the country dooth decay and waste, yt were good the whole leightes of everie windowe at the departure of his lordshippe from lyinge at anie of his sade castels and houses, and dowring the time of his lordshippes absence or others lyinge in them, were taken doune and lade up in safetie; and at sooch tyme as ether his lordshippe or anie other sholde lye at anie of the sade places, the same might then be set uppe of newe with smale charges to his lordshippe; whereas now the decaye thereof shall be verie costlie and chargeable to be repayred.'

We learn also from Ray's Itineracy (p. 187) that 'in Scotland, as late as 1661, the windows of the ordinary country houses were not glazed, and only the upper parts of those of even the king's palaces had glass, the lower ones having only two wooden shutters to open at pleasure and admit the fresh air.'

When desirous in former times of giving encouragement to some important manufactures, the government of France was induced to declare their prosecution to be nowise incompatible with the dignity of aristocratic blood. Early in the fourteenth century that government made a concession in favor of glass-making greatly beyond this point, decreeing, not only that no derogation from nobility should follow the practice of the art, but that none save gentlemen, or the sons of noblemen, should venture to engage in any of its branches, even as working artisans. This restriction was accompanied by the grant of a royal charter of incorporation conveying various important privileges, under which the occupation became eventually a source of great wealth to several families of distinction, whose descendants have at times attained to some of the highest dignities of the state.

The good policy is apparent of thus holding forth inducements to the only parties then qualified by the possession of capital, and probably also by their intelligence, to establish works upon a scale that could lead either to national advantage or individual profit. A middle class of persons, springing from the lower orders, have since gradually placed themselves at least upon a level in point of intelligence with those of more illustrious descent; and by the exercise of that intelligence, conjointly with prudence, have acquired the means of undertaking works of magnitude. This altered state of society would render such exclusive privileges not merely unnecessary, but would make them absolutely pernicious.

Notwithstanding the marked encouragement just related on the part of the French government, some time elapsed before the manufactures of France could rival those of Italy. Venice, in particular, long excelled in the quality of its mirrors and drinking-glasses, with which the manufacturers of that city supplied the rest of Europe. The most considerable of their glass-houses were established at Murano, a village situated a short distance from the city.

During the ministry of the celebrated Colbert, some French artists, who while residing in the Venitian state had acquired a knowledge of the processes used at Murano for the making of plate glass, returned to France in the hope of profitably pursuing the manufacture in their native country. Such an event falling in with the views of Monsieur Colbert, who was anxious by every means to extend the useful arts within the kingdom, these artists were in the year 1665 established with privileges at Tourlaville near Cherbourg, and an advance of money was made to them from the public coffers to assist in the formation of their establishment. The plates made by this company were blown, after the system used in the Venitian manufactories.

It was not until 1688 that the beautiful art of casting plates of glass was invented by a manufacturer named Thevart, who, obtaining a patent for the invention to continue in force during thirty years, established a company and erected works in Paris, where plates were cast of the then extraordinary dimensions of eighty-four inches long by fifty inches wide, a size which excited universal astonishment and admiration. The expense of conducting such a manufactory in the metropolis was, however, so great, that the establishment was transferred to St. Gobain in Picardy, where the undertaking was prosecuted, not without considerable opposition from the more ancient association.

To accommodate the disputes between these rival establishments, Thevart's company was bound not to cast any plates whose dimensions should be less than sixty inches in length and forty inches in breadth. The largest piece that had then been produced by blowing did not exceed fifty inches in its largest dimension. This arrangement failed to produce harmony between the rivals; but in 1695 that end was effectually answered by uniting both companies under the same charter—not however, as the issue proved, to their mutual advantage;—for, possibly owing to the want of the salutary spur of competition, the company declined in prosperity with such rapidity, that in two years from the junction the united body was in a state of insolvency, obliged to discharge most of its workmen, and to abandon many of its furnaces.

No blame can be charged upon the French government for the protection and privileges afforded to these companies. It is probable that without some immunities neither of the establishments could at that early period have been undertaken. The instances however are rare, and the circumstances whereby they have been attended peculiar, in which joint-stock trading companies have been prosecuted to advantage. The causes of this fact are not difficult of explanation. It is seldom that the personal interest of those to whom the particular management is intrusted is sufficiently strong to insure the requisite amount of attention, or the proper degree of pecuniary watchfulness, if even the still more unfavorable condition does not arise wherein private advantage is opposed to the general prosperity, and it is sought to conduct the operations rather with a view to individual profit than to the common advantage.

In the following year a new association was formed out of the ruins of the old company, under the management of Antoine d'Agincourt, who re-engaged the discharged workmen, and by the prudence of his arrangements conducted the affairs with considerable profit to the adventurers.

Blancourt, in his 'Art de la Verrerie,' relates as the mode in which the casting of plates of glass was discovered, that a person who was melting some of this material in a crucible accidentally spilt some of it while fluid upon the ground. The metal ran under one of the large flag-stones wherewith the place was paved, which obliged the workmen to take up the stone in order to recover the glass. He then found it in the form of a plate, such as could not be produced by the ordinary process of blowing. The man's attention being aroused by this fact, he was unable to sleep; and conceiving at once the superiority of this method for forming mirrors, he immediately commenced experimenting; and before the day appeared had proved the practicability of the improvement which the purest chance had thus placed within the sphere of his observation. This occurrence is said to have arisen 200 years before it was related by Blancourt, whose treatise is dated in 1698. It cannot therefore have any reference to the then recent proposals and performance of Thevart.

The manufacture of flint glass was first begun in England in the year 1557, at Savoy House in the Strand, and in Crutched Friars. In 1635 Sir Robert Mansell obtained a monopoly for making this kind of glass, in consideration of his being the first person who employed pit-coal instead of wood in his furnaces. The art could not at this time have reached any great degree of perfection, as permission was further conveyed by the patent for importing drinking glasses of fine quality from Venice, and another half century elapsed before this country became independent of foreign supply for such articles.

The second duke of Buckingham has the merit of much improving the manufacture of British glass by means of certain Venitian artists whom he brought to London in 1670. Three years later than this period, the first plates of English glass were made at Lambeth under the auspices of the same nobleman. The violence of party spirit which characterized that age should lead us to receive with caution all estimates of character which we may find recorded by contemporary biographers. Although there was unquestionably much of vice and profligacy in the general conduct of this favorite of a vicious and profligate master, we may yet hesitate to believe that the man who could apply himself to the study of letters, and who, in the manner above related, interested himself in promoting the useful arts of life, could at the same time be so utterly depraved both in mind and in heart as the page of history has represented.

The first English establishment of magnitude for the casting of plate glass was undertaken in 1773. A respectable body of gentlemen at that time obtained a royal charter of incorporation, the privileges of which were confirmed to them by act of parliament, under the style of 'The Governor and Company of British Cast Plate Glass Manufacturers;' and having subscribed a capital or joint stock in eighty shares of five hundred pounds each, constructed works of considerable extent at Ravenhead, near Prescot, in Lanbashire. This undertaking, the only one of the kind existing in this country, and rivalled by none but that of St. Gobain in France, is still prosecuted with success; and some description of its operations will be found in a future chapter of this volume.

It is deserving of remark that the Chinese, whose early proficiency in the sister art of manufacturing porcelain was long unrivalled in Europe, have yet no practical knowledge of glass making, and that even now there does not exist, throughout that extensive empire, a single glass-house which is properly deserving of that name. Glass working is indeed practised at Canton; but the art is there wholly confined to the re-manufacture of old or broken glass of foreign make, which is melted and either blown or moulded into new forms.

A similar remark may be applied to the inhabitants of Hindostan. Dr. Tennant informs, that 'before the arrival of the Europeans, there was not a house in all India furnished with glass windows,'* although there are not many climates wherein such an employment of glass is more conducive to comfort. The knowledge which the Hindus then possessed of the art of making this material was limited to the manufacture of trinkets and trifling ornaments; in fact, their inability to construct furnaces of power sufficient to melt together the ingredients of which it should be composed rendered it impossible for that people to apply themselves to the manufacture for any more useful purpose. 'Of its adaptation to optical purposes they were so ignorant, as to be astonished and confounded at the effects of a common spy-glass.'†

Any more minute inquiries into the origin and progress of the manufacture of glass would not offer much either of interest or advantage.

A GEOLOGICAL EXCURSION.

AMONG the many expedients, Mr. Editor, which your fertile invention has discovered, to interest the young mind in the useful and innocent pursuits of science, no method, I think, is more effective than the introduction of familiar local circumstances, either by way of illustration, or for the purpose of relating facts.

There is a sentiment, I believe, associated with these well-known things in the mind of the child, which excites the attention and awakens feeling, like the sound of patrial music to the weary exile. Besides, I know it is a maxim of your creed of instruction, that knowledge, like charity, begins at home, and that to neglect what is about us in search of foreign good, is very unphilosophical, to say the least.

I send you a brief sketch of the geology of a pretty island, or rather headland, in our vicinity, merely as an example.

Squantum is distant from Boston about six miles by water, and eight by land, and derives its name from one among the many traditions relating to the aborigines of America. An Indian lover, having sought in vain the affections of a maiden of his tribe, repaired to the rugged and perpendicular cliff which hangs over the sea, being at that time forty or fifty feet high, and having exclaimed, *Squan tum*, i. e. Farewell, squaw, precipitated himself into the deep. This cliff has since been much reduced, although it still retains a pleasant and romantic appearance.

Pudding Stone is very abundant on one side of Squantum; and the masses contiguous to the water, having been worn by the waves, exhibit the different ingredients of this curious geological compound, very distinctly.

Argillite, or *slate*, forms a very long ridge above the beach, and when fractured, presents a rhomboidal form. In one or two instances, it is intersected by a vein of *quartz*. On account of its brittle nature, it is not convertible to many useful purposes to which slate is frequently applied.

* Indian Recreations, vol. i. p. 325.

† Mill's History of Brit. India, vol. i. p. 361. Quarto edition.

Trap Rock exists, though not to any considerable extent. The specimens which we saw, however, were very compact in grain, and of a light green color.

Quartz, *Felspar* and *Horn Stone*, are found in detached portions, and also the numerous pebbly specimens which so generally prevail, and frequently in beautiful variety, upon the beaches of New-England, and indeed more or less over all the Atlantic strand.

H. T. T.

COMMON THINGS.

WATER.

How common, and yet how beautiful and how pure, is a drop of water! See it, as it issues from the rock to supply the spring and the stream below. See how its meanderings through the plains, and its torrents over the cliffs, add to the richness and the beauty of the landscape. Look into a factory standing by a waterfall, in which every drop is faithful to perform its part, and hear the groaning and rustling of the wheels, the clattering of shuttles, and the buz of spindles, which, under the direction of their *fair* attendants, are supplying myriads of fair purchasers with fabrics from the cotton-plant, the sheep, and the silkworm.

Is any one so stupid as not to admire the splendor of the rainbow, or so ignorant as not to know that it is produced by drops of water, as they break away from the clouds which had confined them, and are making a quick visit to our earth, to renew its verdure and increase its animation? How useful is the gentle dew, in its nightly visits to allay the scorching heat of a summer's sun!—And the autumn's frost, how beautifully it bedecks the trees, the shrubs, and the grass; though it strips them of their summer's verdure, and warns them that they must soon receive the buffetings of the winter's tempest. This is but water, which has given up its transparency for its beautiful whiteness, and its elegant crystals. The snow, too—what is that but these same pure drops thrown into crystals by winter's icy hand. And does not the first summer's sun return them to the same limpid drops?

The majestic river, and the boundless ocean—what are they? Are they not made of drops of water? How the river steadily pursues its course from the mountain's top, down the declivity, over the cliff, and through the plain, taking with it every thing in its course! How many mighty ships does the ocean float upon its bosom! How many fishes sport in its waters! How does it form a lodging-place for the Amazon, the Mississippi, the Danube, the Rhine, the Ganges, the Lena, and the Hoang Ho!

How piercing are these pure limpid drops! How do they find their way into the depths of the earth, and even the solid rock! How many thousand streams, hidden from our view by mountain masses, are steadily pursuing their courses, deep from the surface which forms our standing-place for a few short days! In the air, too, how it diffuses itself! Where can a particle of air be found, which does not contain an atom of water!

How much would a famishing man give for a few of these pure limpid drops of water! And where do we use it in our daily sustenance? Or rather, where do we not use it? Which portion of the food that we have taken during our lives did not contain it?—What part of our body, which limb, which organ, is not moistened with this same faithful servant? How is our blood, that free liquid, to circulate through our veins without it?

How gladly does the faithful horse, or the patient ox, in his toilsome journey, arrive at the water's brink! And the faithful dog patiently following his master's track—how eagerly does he lap the water from the clear fountain he meets in his way!

The feathered tribe, also; how far and how quick their flight, that they may exchange the northern ice, for the same common comfort rendered liquid and limpid by a southern sun!

Whose heart ought not to overflow with gratitude to the abundant Giver of this pure liquid, which his own hand has deposited in the deep, and diffused through the floating air, and the solid earth? Is it the farmer, whose fields, by the gentle dew and the abundant rain, bring forth fatness? Is it the mechanic, whose saw, lathe, spindle, and shuttle, are moved by this faithful servant? Is it the merchant, on his return from the noise and the perplexities of business, to the table of his family, richly supplied with the varieties and the luxuries of the four quarters of the globe, produced by the abundant rain, and transported across the mighty but yielding ocean? Is it the physician, on his administering to his patient some gentle beverage, or a more active healer of the disease which threatens? Is it the clergyman, whose profession it is to make others feel, and that by feeling himself, that the slightest favor and the richest blessing are from the same source, and from the same abundant and constant Giver? Who that still has a glass of water and a crumb of bread, is not ungrateful to complain?

GEOLOGY.

GRANITE.

There was a time when the earth was without form and void—when darkness was upon the face of the deep—when the spirit of God moved upon the face of the waters—when it was said, let dry land appear.

The fact that our globe was once a general chaos—a vast chaotic ocean, holding in solution the elements of rocks, hills, and mountains, is alike proved by the volume of inspiration, and the older volume by the same author—the volume of nature. On almost every rock, ledge, and mountain mass, are characters indelibly engraved, which give abundant proof that Moses spoke the words of truth and soberness; that our earth, with all its furniture now offered to our hands, was brought out of the same general chaos, by the same Workman, and about the same time, as mentioned by the writer of Genesis and several succeding books.

The present aspect of rocks and mountains, not only proves, that all of the very brief but highly interesting account of our planet as given by Moses is true, but it informs more minutely of the various steps of its progress in coming to its present form, than is done by the sacred historian. The position, ingredients, and structure of rocks and of countries, informs us, not only that the formation of hills, mountains, and metals, has been gradual, but show also something of the order of the several steps of this formation. No one ever doubts, who visits the tin and copper mines, and observes that when veins of these two metals cross each other, the tin is always cut by the copper, and never the reverse, that the former is the oldest of the two metals. An examination into the position and other circumstances connected with granite, gneiss, and mica slate, will satisfy any one, that the first mentioned is the oldest—that granite was the first substance formed when it was said, Let dry land appear. However geologists may differ in other respects, they are all agreed in the opinion, that granite is the oldest rock upon our globe, and that from it and other rocks were formed soils, and that all soils partake of the character of the contiguous rocks.

As thousands of children under six years of age are now familiar with granite, and the three ingredients which compose it, many of our readers perhaps will think, that a description of this rock, so renowned for its antiquity, is unnecessary. We hope, however, that they will pardon us for describing, in a few words, some of the characters of this central and foundation stone of our little planet.

Quartz, felspar, and mica, the three simple minerals described in our former numbers, or according to predominance, felspar, quartz, and mica, are the ingredients of granite. In some granite masses, felspar constitutes much the largest part. In others, felspar and quartz form about equal portions of the rock. The mica is the least abundant of the three, though it varies much in quantity and arrangement.

In some masses of granite, one of the three ingredients is entirely wanting. A species of granite much used in Boston and the vicinity, and brought from Cape Ann, is composed entirely of quartz and felspar, the former of a dark color. The material of which the Dedham Court House is constructed, is a beautiful variety of granite, entirely destitute of mica; the quartz nearly white, which gives the building a light and cheerful complexion.

Graphic granite, which takes its name from its having some resemblance to writing, is composed principally of felspar, with small quantities of quartz running in irregular lines through the mass. This is the rock which, by the decomposition of the felspar, is changed into a white clay, sometimes called kaolin, or porcelain clay.

A beautiful kind of granite, with red or flesh-colored felspar, abounds in Egypt, where it is much used for building, and is sometimes handsomely polished, and is hence called Egyptian granite.

Many other varieties of granite might be mentioned, but the occasion forbids it.

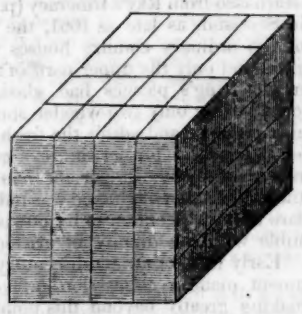
The Andes, the Alps, the Pyrenees, the Carpathian, and most or all the highest mountains upon the earth, are composed more or less of granite. In New England, and all the Atlantic states, granite abounds in nearly every town or district.

Granite countries are generally uneven, precipitous, and bold in their appearance, and intersected with beautiful and rapid water courses. And as the character of the inhabitants resembles in some measure the features of their country, with the rumbling or the roaring of the mountain streams, are mingled the buz of wheels, and the clattering of shuttles; over thickets of rocks wave the richest wheat, and the sides of rivers are lined with flourishing villages, with spires of churches rising above all other objects, to inform the approaching traveller, that among other privileges fitted for *physical*, *intellectual*, *social*, *moral*, and *religious* beings, they have altars erected and dedicated to the Living God.

GEOMETRY.

PARALLELOPIPEDS.

No. 1.



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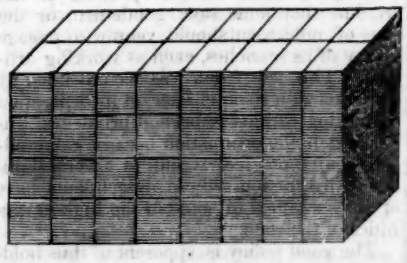
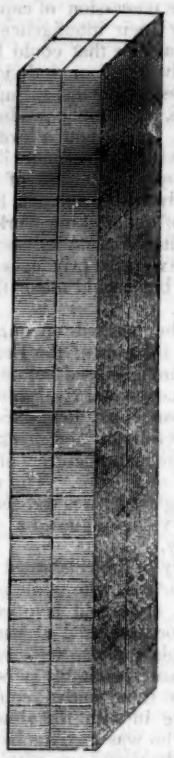
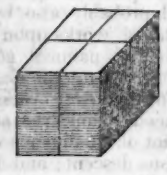


No. 3. No. 4.





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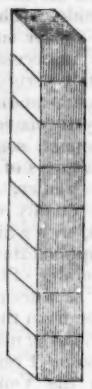

No. 6.

If the readers of this article will cast their eye upon a common brick, a scrap box, a square block of wood, or upon the floor, wall, sides, and corners of their rooms, they will see a very simple figure, denoted by the long hard word, and represented by the cuts above. They will readily see by how many surfaces such a solid is enclosed, and what shape or figure those surfaces are; whether they are parallelograms, triangles, circles, or semicircles. And if they are parallelograms, whether they are squares, oblongs, rhombuses, or rhomboids. If any should be at a loss respecting the specific meaning of either of the four words above, they can be satisfied in an instant, by recurring to the article on Geometry, in the last number of the Lyceum.

If any one should observe a box, a block of granite, or block of wood, enclosed entirely in squares, he would see a specimen, not only of a parallelopiped, but a solid still more specific in its shape and name; it is called a *cube*.

It will readily be seen, by the diagrams and description in our last number, that any surface enclosed by four lines, the opposite ones *parallel*, is called from that circumstance a *parallelogram*; and that there are four, and only four, different kinds of parallelograms. In each of the four, as has already been mentioned, the opposite sides are parallel. Each has its opposite sides and angles equal.—Two have all their sides equal, and two all their angles equal. Those two with equal angles have four right angles. Those with only the opposite angles, have two obtuse and two acute angles.

By examining the parallelopipeds belonging to the 'Family or School Apparatus,' and less clearly by the cuts connected with this article, it will be seen, that solids may be enclosed entirely in squares, entirely in oblongs, in oblongs and squares, in squares and rhomboids or rhombuses, in oblongs and rhomboids or rhombuses, and squares, oblongs and rhomboids or rhombuses. All such solids, from the fact that they are entirely enclosed in parallelograms, are called parallelopipeds. [The *i* in this long hard word, has the same sound as in pin, and is accented.]

As a knowledge of the various properties and applications of the several parallelopipeds, is the corner and foundation stone of the whole work of practical mensuration, and as a familiar acquaintance with the principles relating to this class of solids, and the other figures which have already been presented in our numbers, would enable our readers, many of them at least, to go along in a pleasant, practical, and useful course of Geometry, we invite their attention particularly to this subject. And if their time should permit, we believe that they would find it useful to examine and compare the six articles now presented in the Lyceum, and to become familiar, not only with the principles of each, but with their connections, relations, and applications.

We could mention numerous most egregious mistakes committed by sensible and *practical* men, in their business and intercourse with each other, arising entirely from an ignorance of two or three principles of parallelograms and parallelopipeds, which are not only fundamental but perfectly simple when illustrated by diagrams and solids, and are yet not known or apprehended by one person to ten, even among the citizens of our most intelligent villages. Two cases we will mention.

A person made a contract for as much water at a mill privilege, as could be discharged through a hole two inches in diameter. After the contract was completed, the purchaser said to the seller, 'How much should you charge me for what can be discharged through a hole four inches in diameter?' 'Twice the sum you are already to give,' replied the seller. Another bargain was of course closed, and the purchaser obtained four times the water for twice the money, as will be seen by a glance at diagrams Nos. 1 and 4.

An experienced and skilful painter, who had followed his profession for more than thirty years, was asked the price of painting a large number of boards 20 inches by 30. He named a price per square yard. It was then remarked by the inquirer, that each board contained a little less than half a square yard. 'No,' replied the painter, 'it must be more than that; thirty-six inches by thirty-six is a square yard, and eighteen by eighteen is half a yard.'

By examining the cuts connected with this article, it will be seen that parallelopipeds No. 1 and 4 and 6, represent cubes, or solids enclosed wholly in squares. No. 6 is a one measure cube, and may represent an inch, foot, yard, rod or mile. No. 4 is a two measure cube, and No. 1 is a 4 measure cube; that is, in diameter, each is double of the one mentioned before it. Now the question is, what is the comparative bulk, or solid contents, of the three cubes? This question is asked, because it involves a principle, which is at the foundation of the whole business of the mensuration of solids, and because there is probably not one person to ten who would give a correct answer on the first impression.

To have the question fully understood, it may be varied thus; what are the solid contents of a 1 inch, 2 inch and 4 inch cubes, and what proportion do their contents bear to each other.

Again, parallelopipeds No. 1, 2 and 3, will be found, by examination perhaps, to have the same contents, and the question is, what are the contents of each, and by how many inches of surface is each enclosed, supposing each of the squares to represent a square inch; and No. 1 to be a two inch cube, the dimensions of No. 2, to be 8, 4 and two inches, and No. 3 to be 16, 2 and 2.

As the principles intended to be illustrated by these diagrams and questions are so applicable to the business of every farmer, mechanic and merchant, and to that of every man, woman and child in the world, it is hoped they will receive some attention, both in this and the future numbers.

Cork.

Cork is the bark of a kind of oak, growing chiefly in Spain. When it is taken from the tree, the bark is cut longitudinally, and at the extremities of the slit, incisions are made round the trunk; it is then easily stripped off by means of a curved knife, with a handle at both ends. When the bark is taken from the tree, it is piled up in a ditch or pond, and heavy stones are placed upon it in order to flatten it. After being dried it is slightly burnt, then packed for exportation. One principal use of Cork is to stop bottles, for which purpose it is fitted by its elasticity; a piece rather larger than the neck of the bottle, being inserted into it, the tendency it has to resume its former shape causes it completely to fill up the aperture, and exclude the air. Being lighter than water, it is very useful to those who are learning to swim, by buoying them up; it is also employed in the construction of life-boats, and the floats of fishing-nets. The Spaniards make lamp-black of it. The men employed in cutting and preparing it for sale, are called cork-cutters.

Indian Rubber, or Gum Elastic.

Indian Rubber is the concrete juice of a tree which grows in South America. In order to procure it, the Indians make incisions through the bark of the tree in wet weather, and a milky juice oozes out, which is spread over moulds of clay; when this is dry, a second layer of the liquid is put on it; this operation is repeated till the Indian Rubber is of the thickness required. After this it is placed over the smoke of burning vegetables, which hardens and darkens it. The Indians convert it into bottles, boots, and flambeaux. The principal uses to which Indian Rubber is applied here, are, for the effacing of black-lead marks, for cricket-balls, for flexible tubes, syringes, and other instruments used by surgeons and chemists.—Cloth of all kinds may be made impenetrable to water, if impregnated with the fresh juice of the Indian Rubber tree. Indian Rubber, cut very thin, is now also used to sheath the bottom of vessels, and is an effectual preservative from the injuries of shell-fish.

Sponge.

Sponge is a marine production; it was formerly supposed to be a vegetable, but the opinion now generally entertained is, that it is a habitation constructed by a little worm, one of the species considered to occupy the lowest rank in the animal kingdom. It is found adhering to various marine substances at the bottom of the sea, especially in the Mediterranean; it is procured by divers, who are early trained to this hazardous employment. Sponge absorbs fluids rapidly, and yields them again when compressed; this property occasioned it to be frequently saturated with myrrh and wine, and given to persons suffering the punishment of crucifixion, in order to alleviate their pain, and subdue the intolerable thirst which is the consequence of their agony. To this custom the sacred historian refers in the history of our blessed Lord; but his unrelenting persecutors, instead of offering him the enlivening portion of myrrhed wine, which was rarely denied to the vilest malefactor, 'filled a sponge with vinegar, and put it upon hyssop, and put it to his mouth.' The offer of vinegar was considered, among the Jews, as an intolerable outrage to their feelings. It is alluded to in the following passage, which at the same time foretold the future sufferings of the Redeemer of mankind. 'Reproach hath broken mine heart, and I am full of heaviness; and I looked for some to take pity, but there was none; and for comforters, but I found none. They gave me also gall for my meat, and in my thirst they gave me vinegar to drink.' Psalm lxix. 20, 21.

From Percy Anecdotes.

Galileo.

The succession of the noble discoveries made by Galileo, the most splendid, probably, which it ever fell to the lot of one individual to make, in a better age would have entitled its author to the admiration and gratitude of the whole scientific world; but they were viewed at the time with suspicion and jealousy. The ability and success with which Galileo had labored to overturn the doctrines of Aristotle and the schoolmen, as well as to establish the motion of the earth, and the immobility of the sun, excited many enemies. The church itself was roused to action by reflecting that it had shaken the infallibility of its judgments on the truth of the very opinions which were now in danger of being overthrown.

The dialogues of Galileo contained a full exposition of the evidence of the earth's motion, and set forth the errors of the old, as well as the discoveries of the new philosophy with great force and reasoning, and with the charms of the most lively eloquence. They are written indeed with such singular felicity, that we read them at the present day, when the truths contained in them are known and admitted, with all the delight of novelty, and feel carried back to the period when the telescope was first directed to the heavens, and when the earth's motion, with all its train of consequences, was proved for the first time. The author of such a work could not be forgiven. Galileo accordingly was twice brought before the Inquisition. The first time, a council of seven cardinals pronounced a sentence, which for the sake of those disposed to believe that power can subdue truth, ought never to be forgotten: "That to maintain the sun to be immovable, and without local motion, in the centre of the world, is an absurd proposition, false in philosophy, heretical in religion, and contrary to the testimony of scripture. That it is equally absurd and false in philosophy to assert that the earth is not immovable in the centre of the world, and, considered theologically, equally erroneous and heretical."

Galileo was threatened with imprisonment, unless he would retract his opinions, and a promise was at length extorted from him, that he would not teach the doctrine of the earth's motion either by speaking or writing. To this promise he did not conform.

In the year 1663, Galileo, now seventy years old, was again brought before the Inquisition, forced solemnly to disavow his belief in the earth's motion, and condemned to perpetual imprisonment, though the sentence was afterward mitigated, and he was allowed to return to Florence. The sentence appears to have pressed very heavily on Galileo's mind, and he never afterward either talked or wrote on the subject of astronomy. Such was the triumph of his enemies, on whom ample vengeance would have long ago been executed, if the indignation and contempt of posterity could reach the mansions of the dead.

Dancing.

Dancing, which may be considered the most universal of all pastimes, was at first, and indeed during several thousand years, a religious ceremony. The most ancient dance of which we have any particular account, is that of the Jews, established by the Levitical law, to be exhibited at their solemn feasts. After the passage of the Red Sea, we are told, 'Sumpsit Maria prophetissa, soror Aaaron tympanum in manu sua egressaque,' &c. On this occasion there were two distinct bands, one of men, and the other of women.

The daughters of Shiloh were dancing in the vineyards when they were caught by the young men of the tribe of Benjamin, who were advised by the elders of Israel to take the opportunity of supplying themselves with wives. The dancing of David is often quoted, and it is the opinion of some commentators, that every psalm had a separate and distinct dance belonging to it. 'In utroque Psalmo nomine chori intelligi posse cum certo instrumento, homines ad sonum tripudiantes.'

In the temples of Jerusalem, Samaria, and Alexandria, a stage was erected in one part, called the choir, for these exercises; the name of which has been preserved in our churches; and the custom, too, till within a few centuries.

Cardinal Ximenes revived the practice of Musarabic masses in the cathedral at Toledo, when the people danced both in the choir and the nave, with the greatest decorum and devotion. Le Pere Menetrier, a Jesuit, relates the same thing of some churches in France, in 1682. So that the sect of Dancing Methodists at Philadelphia, of which such alarming accounts have been given, seem rather to have abused than invented the custom.

The Egyptians had their solemn dances as well as the Jews; the principal was their astronomical dance, of which the sacreligious dance round the golden calf, was an imitation. From the Jews and Egyptians, these sacred dances passed into Greece, where the astronomic dance was adapted to the theatre, with chorus, strophe, anti-strophe, epode, &c. The Greeks had, likewise, the following dances: the dance of the Curetes, or Corybantes, from the Cretans, and which was anterior to Jupiter, as it is supposed to have saved his life when an infant; the dance of satyrs, invented by Bacchus; the Memphytic dance, invented by Pyrrhus; the rustic dance, invented by Pan; and the *ball dance*, invented, according to Philostratus, by Comus; according to Diodorus, by Terpsichore; the Hormus, a Lacedemonian dance, which required to be taught at a very early age; and the dance of *innocence*, which was performed by young women. The last was also a Spartan dance, and though so *simple*, was the cause of the *double* indignity offered to Helen, the Trojan war, and all the subsequent calamities. Æschylus and Lucian mention a Spartan dance which was accompanied by singing.

Many of these dances are still retained in Greece; but the most curious and interesting of them all, is the nuptial dance, which Mr. Dodwell, in his tour, describes as having seen at Athens, on the marriage of Albanian Christians. When the bride, who was dressed in the gayest attire, had arrived from the country, and approached the house of the bridegroom, she was encircled by all the principal females, who assembled before the door, and while they danced around her, welcomed her arrival with a degree of elegance which not only captivated the imagination, but interested the affections. They sung at the same time the nuptial songs.

From Greece, these dances, with the various modifications, found their way across the Adriatic. Rome adopted her manners and her arts, which were afterwards dispersed over the rest of Europe. The great Scipio Africanus amused himself with dancing. 'Not,' says Seneca, "those effeminate dances which announce voluptuousness and corruption of manners, but those manly animated dances in use among their ancestors, which even their enemies might witness without abating their respect.'

Dancing has always been a favorite amusement in England. So far back as the twelfth century, the damsels of London spent the evenings on holidays in dancing before his masters' doors. Stowe laments the abolition of this 'open pastime,' which he remembered to have practised in his youth; and considered it not only as innocent in itself, but also as a preventive to worse deeds 'within doors,' which he feared would follow the suppression.

Dancing was constantly put in practice among the nobility upon days of festivity, and was countenanced by the example of court. After the coronation dinner of Richard the Second, the kings, the prelates, the nobles, the knights, and the rest of the company, spent the remainder of the day in dancing in Westminster Hall to the music of the minstrels. Several of our monarchs are praised for their skill in dancing, and none more so than our Henry the Eighth.

Political Economy.

The interest of the money expended in erecting a prison at Philadelphia, is sufficient to pay the tuition of ten thousand children at infant schools.

The expenses of the militia of Massachusetts is not less than half a million annually, which is more than sufficient to establish a Lyceum Seminary, or self-supporting school in every county in the state, at 30,000 dollars each. The one expenditure designed to enable men to kill and devour each other; the other designed to aid each other in every good work.

In Ohio and the other western states, those towns, which, at their commencement, from twelve to fifteen years ago, established schools and public worship, are now accommodated and ornamented with good roads, comfortable dwellings, framed, two stories, and painted, with commodious barns, productive orchards, safe enclosures, and above all, with intelligent, moral, and refined society; while those which have been settled from twenty to thirty years, and have neglected schools and churches, have few buildings but log houses, with one room, no roads but such as nature furnishes, no orchards, no barns, and little cultivated land except a few acres around their cabins, sufficient to raise corn for their bread; and they are even unable to find time to comb their children's heads or wash their faces.

Throughout New-England, those towns whose citizens have erected for their schools, commodious houses, have been able also to erect for themselves neat or elegant dwellings; while those which are unable to build school-houses, are also unable to erect dwellings, except plain, unpainted, one story buildings. Where they are able to erect churches, at an expense of 5 or 7 thousand dollars, they are able to ride in chaises, worth $250, while those who have the poorest churches, ride to them in waggons, on horseback, or go on foot.

Progress of the Arts.

A few years since, Chrome Yellow was sixteen dollars a pound; it is now made with such ease in Baltimore, from a mineral found in great abundance in the vicinity of that city, as to be sold at twenty cents a pound.

All the Copperas used in this country, was until recently imported from England; it is now made in several places from a mineral found in great abundance in many parts of our country; and the importation, it is believed, is wholly stopped.

Fifteen or twenty years since, a pupil of Professor Silliman, when out with him on a geological excursion in the vicinity of Yale College, found that many of the farmers there had built their common stone walls, for one hundred and fifty years, with some of the most beautiful marble in the world, without a suspicion that it was any thing more than *common stone.*

SCHOOL STATISTICS.

From the Quarterly Register.

GERMANY.

In most of the states, which formerly composed the Confederation of the Rhine, as Wirtemberg, Bavaria, Baden, Hesse, &c., a public school is established in every parish, and, in some instances, in every hamlet. The master, as in Scotland, receives a fixed salary from the parish, exclusive of a small fee from the scholars. Besides the salaries and fees, the masters are furnished with a house, a garden, and in most instances, a few acres of land. The books, used in the schools, are generally very good. No particular system of religion is allowed to be taught, in Wirtemberg, and most of the other Germanic states. The sons and daughters of Lutherans, Calvinists, Catholics, Quakers, &c. frequent the same schools. Several of the governments have enacted laws by which *every individual is compelled to send his children to school, from the age of six to fourteen years.*

In Bavaria, the beneficial consequences resulting from the establishment of a system of national education, have been more signal than in any other European country. The late and present kings of Bavaria have been truly the fathers of their country. They have not only swept away numerous abuses, and established a respectable form of government, but they have laid deep the foundations of permanent improvement in the organization of an admirable system of education. A school is established in every parish, to which every one is obliged to send his children from the age of six to fourteen. The following is the schedule of education for 1825.

	No.		No.
Universities,	3	Norman Schools,	7
Lyceums,	7	Schools for Foreigners,	1
Gymnasia,	18	Law Schools,	2
Colleges,	21	Veterinary,	2
Preparatory Schools,	35	Midwifery,	2
Houses of Education,	16	Royal Schools,	2
Houses for higher branches,	7	Public or National Schools,	5,394
Boarding Schools for Girls,	2		

Number of inspectors of schools, 286; teachers, 7,114; pupils of all classes about 493,000. Number of inhabitants in Bavaria, 4,032,590. About *one eighth* attend school. In Scotland only *one tenth.*

Throughout Germany the greatest attention is paid not merely to the acquirements of teachers, but to their *capacity for teaching.* Consequently *normal* or pattern schools have been established in all the principal towns, attended by those who expect to engage in the business of instruction. Some of them enjoy a very high reputation.

Mr. Loudon, an intelligent man, who travelled through this part of Germany in 1828, says, 'From what I have seen of Wirtemberg, I am inclined to regard it as one of the most highly civilized states in Europe. Every individual in Wirtemberg, reads and thinks, and to satisfy oneself that such is the case, he has only to enter into conversation with the first peasant he meets, to observe the number and style of the journals, and the multitude of libraries. I did not meet with a single beggar in Wirtemberg, and with only one or two in Bavaria and Baden.'

RUSSIA.

The present number of journals which are issued from the press in Russia is 73. The three, which have the most extensive circulation, are published in *twelve* different languages. The number of elementary schools is 1,411; they are frequented by 70,000 pupils, so that on a comparison of the total number of children capable of instruction in the Russian dominions, with those actually educated, there does not appear to be more than 1 in 367 whose mind is even superficially cultivated. The Russian government has recently labored with great earnestness, to promote the instruction of its subjects; and the astonishing advances which they have made in a comparatively short period, show that they have not labored in vain. Thirteen masters have been tending Mr. Heard's school in Petersburg, in order that they might introduce the system into as many provinces, by means of normal schools.

SWEDEN.

We have no information of the state of the public schools in this country. The British and Foreign School Society has established 192 schools of mutual instruction, containing 12,711 children; the king has granted permission to import slates free of duty, and proposed that the Estates should assign 6,000 rix dollars for organizing a normal school. Hopes are likewise entertained that the teachers would be paid out of the public revenue.

BELGIUM.

A pleasing report has been transmitted from the Brussels Society, by which it appears that the normal schools there are in a state of great activity and gradual improvement.

ICELAND.

Dr. Henderson says that 'the general principles of knowledge are universally diffused among the inhabitants of Iceland. Though there be only one school on the island, and that one exclusively designed for the education of such as are afterwards to fill offices in Church and State; yet it is exceedingly rare to meet with a boy or girl, who has attained the age of nine or ten years who cannot read and write with ease. Domestic education is most rigidly attended to; and it is no uncommon thing, to hear youths repeat passages from the Greek and Latin authors, who have never been farther than a few miles from the place where they were born. Nor do I scarcely ever recollect entering a hut, where I did not find some individual or another, capable of entering into conversation with me, on topics which would be reckoned altogether above the understandings of people in the same rank of society in other countries of Europe.'

ITALY.

In no country, perhaps, is the education of the lower classes in society more neglected than at Rome and in other parts of Italy: and nowhere are the people more factious and insubordinate: nowhere is it more difficult to procure servants or craftsmen who are respectable, faithful, or obedient. The duke of Lucca, in August last, published an edict, in which he stated his conviction of the great importance of education being generally communicated to his subjects of all classes, and also, that the Lancastrian method of instruction is best calculated to carry this design into effect. He ordered that two schools for boys and two for girls be immediately established at Lucca.

GREECE.

The amount of subscriptions for free schools, made by the Greeks, from Sept. 1828, to Sept. 1829, was about $6,300. This is only a part of what was done in that time for this object. There were distinguished instances of individual munificence, which do not enter into the above estimate. A school for boys and girls was commenced in the island of Syra, by Mr. Brewer, in 1828. A house was soon built large enough to contain 300 pupils. The number soon rose to 330. The Greek ladies raised 2,200 piastres for the new school house. Many of the scholars have manifested great capacity, and have made most encouraging attainments. Every one of the *Ionian* islands, seven in number, has a classical school, or academy. According to the last report there were 69 schools, 72 teachers, 2,102 scholars. On 15 of the more important *Greek* islands, 32 schools are reported, containing 1,979 scholars.

Mr Brewer, at the first quarter's examination of his female school, in Smyrna, on the 8th of July, 1830, says that 96 Greek girls were examined before crowds of Armenians, Jews, Catholics, Turks, Greeks, English, &c.

APPARATUS.

FOR SCHOOLS.

The eye is a most powerful and efficient inlet of knowledge. On many subjects, a mere glance of that organ will do more than a course of reading and study for weeks or even months. To young minds possessed of but few ideas to use for acquiring others, visible illustrations are indispensable. Without them, their progress in learning will be merely collecting words without ideas. Nor can it be doubted, that wherever the nature of the case admits of it, representations to the eye ought to precede a description from the book or the teacher. As the uniform and distinguished success of infant schools has demonstrated the truth of these remarks, they are not presented in the form of theories, but of facts; and of course do not require words to prove them.

Although the importance of apparatus for the instruction of children, must appear manifest from a moment's reflection, and has been fully demonstrated by experiment, the sentiment still prevails too extensively, that study is necessary before it can be used to advantage.

An erroneous sentiment obtains, not only in relation to apparatus for the use of children, but respecting the subjects most easy and natural for them to comprehend, and most useful for them to learn. The most unfortunate impression exists to a great extent, that the learning of letters, spelling, reading, writing, &c., are the most important, if not the only important subjects to occupy the attention of young children; and that the sciences, or the laws and works of nature, are above their comprehension, and not fitted for their use.

The order in which those subjects should be taught to children, whether considered in relation to their easiness of comprehension or their practical utility, most certainly ought to be reversed. Every child, in his earliest infancy, is a natural philosopher.—He experiences the most intense delight, in his endless and endlessly varied experiments to ascertain the nature or properties of objects around him, and of the laws which govern them. The whole circle of the sciences is examined and relished, to some extent, by children; and the examination is commenced at a very early period. The experiments tried by them, in chemistry, mechanics, hydrostatics, pneumatics, optics, botany, mineralogy, &c., are innumerable, and all calculated to give them the knowledge which they most need, and which they constantly use in their daily pursuits in life.

If one science is commenced by infants earlier than any other, and more than any other, lies at the foundation of an intellectual and practical education, that science is *geometry*. It is evident that one of the first impressions made upon the mind of an infant, when he opens his eyes upon the light of heaven, is the shape or figure of objects around him. He commences the study of figure or geometry by the eye, and after a few weeks, brings to its aid the hand. It is by seeing and feeling the various objects around us, that we learn their shape and are enabled to compare one with another. By this examination and comparison, we learn the nature and properties of all figures, both of surfaces and solids, and the relations that exist between them. The properties and relations of figures, are nothing more nor less than the science of geometry.

Although children commence almost with their existence the study of geometry, chemistry, natural philosophy, and almost the whole circle of the natural sciences, and pursue them with the greatest ardour and delight, and greatly to their advantage in their future avocations, (whatever these may be,)—both the delight and the advantage of these studies might be greatly aided by facilities which parents and teachers can put into their hands. It adds much to the pleasure and the practical utility to be derived from the natural sciences, to have the elementary principles clearly and familiarly understood. To understand the properties and relations of different shaped surfaces and solids, diagrams and models of solids are exceedingly desirable if not indispensable.—The nature of circles, squares, triangles, spheres, cubes, cylinders, pyramids, cones, &c., and their resemblances and differences, will be better understood by a mere glance of the eye on the things themselves, than could be done by descriptions, however accurate, and however long continued. If these views are correct, a set of geometrical diagrams and solids must be a valuable part of the furniture of every nursery and school-room.

A small globe, merely to show the shape, motions, and a few of the great divisions of the earth, a simple representation of the solar system, a few cheap and simple articles to illustrate some of the most interesting and important principles of chemistry and natural philosophy, specimens in geology, sufficient to explain the rocks children pass in going to and from school, slips of the principal American forest trees, representing the bark, wood, and leaf, with a description and explanation given of each in a small tract, would be valuable appendages to a school-room.

That these subjects would be interesting to children, and wholly within their comprehension, is triumphantly proved in infant schools, as well as by the course voluntarily and ardently taken by almost every child in his little, but ceaseless and healthful enterprizes of sport and mischief, as soon as he gains the power of locomotion. The whole of this will be explained, when the fact, too seldom realized, is understood, that almost every principle of science when divested of verbiage and technicalities, and presented in its native character, is remarkable for its simplicity, and its fitness to interest as well as to enlarge the minds of children. Surely a child need not be very old to learn, that if an iron rod is put into the fire it will be made longer, or after seeing a few experiments, to understand the general proposition that heat enlarges bodies.

It does not require great maturity of intellect to learn the fact, that glass is more brittle than lead, that gold may be beaten into thinner leaves than iron, or that iron is stronger and more apt to rust than gold; yet these facts all belong to the science of chemistry, and are fitted to amuse and instruct children, and put them in possession of knowledge which they will have occasion to use in almost every pursuit in life.

If any person will inquire for a moment, through what organ impressions are made upon the minds of children most rapidly, distinctly, permanently, and agreeably, what kind of knowledge they are in infancy most eager to obtain, and what they have the most frequent and important occasions to use in the daily and ordinary pursuits of life, he must be ready to acknowledge, that apparatus, and specimens to explain the laws and the works of creation, are an essential appendage to every school-room and every nursery.

GEOLOGY.

FOR SCHOOLS.

Few subjects have a stronger claim to a place in a system of popular education, than Geology. Numerous reasons urge its introduction into every school.

1. It is nearly allied to geography; and, like that, is calculated to enlarge the minds and extend the views of children, by acquainting them with the earth they inhabit. If it does not inform us of the situation and comparative size of continents, islands, and mountains, it teaches us what continents, islands, and mountains, are composed of.—If it takes no notice of cities, kingdoms, and empires, upon the earth, or the changes which have been produced upon its surface, by the industry or the ravages of men, it describes the more sublime changes it has suffered, by the hand of time, and the agency of earthquakes and volcanoes. If it gives no history of the nations that have risen, and flourished, and fallen, upon the earth, it contains a history of the earth itself. It informs us what it was when it was without form and void, what changes it suffered when the fountains of the great deep were broken up, or when other convulsions shook it to its centre.

2. It is an interesting science. It opens to our view a new world, and presents us with numerous objects of beauty and of interest, before unnoticed. The most barren ledges, the commonest rocks and walls by the wayside, destitute of anything to admire or notice, show to groups of young explorers, that these have not merited the long neglect they have suffered; that they contain much that is rich and beautiful, not merely when arranged on the shelves and cases of a cabinet, but when placed on the mantelpiece of the parlour or drawing-room, and furnishing instruction and delight to the most elevated minds.

3. It is among the grandest of the sciences. It leads us to view, with increased admiration, the towering mountain and awful precipice, and induces and enables us to examine with greater ardor, and more exalted delight, those features of the earth, which never fail to excite ideas of sublimity even in the rudest mind. We learn from it, that amid the lofty aspect, the terrific grandeur, and the wild confusion, of the Alps and Andes, there is order and regularity, which evince the skill of a wise and all-powerful architect. Arrangement amidst apparent disorder, a vast storehouse of riches overhung by forms of terror, objects of the highest beauty grouped beneath the awfully sublime; afford to the passing geologist a moral as well as an intellectual banquet.

4. It gives new interest and increased utility to our journies and our walks. A person with the slightest knowledge of geology, never passes from one country or place to another, without finding much to admire, and much to increase his store of knowledge. If he finds no thriving village, no field covered with the fruits of the farmer's industry, no fertile tract groaning under its load of stately forest trees, or smiling beneath its dress of beautiful verdure, he still finds in the barren plain or the broken ledge, much that is beautiful, rich, and instructive.

5. It furnishes a healthful and instructive amusement to the young. Wherever it has been introduced into schools, the pupils have taken more or less of their pastime in examining and collecting specimens of minerals within their reach. A geological excursion is uniformly preferred by them to their ordinary sports, too often calculated to dissipate their minds, and unfit them for patient and successful application, when they return to their school rooms or their books.

6. It teaches children to be observing.—A thousand objects before unnoticed press upon their view; their imagination and taste are awakened, and called into vigorous and healthful exercise in discriminating the aspects of objects. Their minds once put upon the search to discover what is beautiful and rich in the mineral kingdom, are led to examine other parts of this wide creation; and wherever they go, or whatever they see, they find something to admire, and to convey to their minds entertainment and instruction.

7. It leads to useful discoveries. Wherever the science of geology has been introduced into schools, or to the attention of other young people, valuable discoveries have been made to enrich the treasures of science, or to furnish new sources of industry and of wealth, both to individuals and the nation. If but once introduced into all our schools, the whole country would be put under the most minute and rigid examination, and compelled to yield up its treasures, now buried beneath the surface of the earth. In New England alone, from one to two hundred thousand young, but ardent and efficient surveyors might be induced to afford their gratuitous and cheerful services, to explore our resources in the mineral kingdom; and while they amused and instructed themselves, they would make important accessions to the public treasures of science and of wealth.

8. As the adoption of geology as a branch of common education, uniformly leads to a thorough examination of the natural features of the country, it would prepare the way for obtaining maps of all the towns where it should be introduced. Considering the trifling expense at which lithographic prints of town maps can be procured, and the important vehicles they would be to convey a minute and accurate knowledge of the character and resources of our country to the minds of its inhabitants, few subjects better deserve the immediate attention of every town.*

9. No science is more practical. It acquaints farmers with the nature of their soils, and the best methods of improving them: civil engineers with the materials for constructing roads, canals, railways, wharves, dams, &c. and the proper method of combining them: artists with the origin and nature of paints, and other substances in common use: and the miner when and how to extend his researches, pointing him to a reward for his labours, and guarding him against abortive attempts.

Agriculture, internal improvements, manufactures, and the various useful arts, occupy, at present, so large a place in public attention, as to render every method which can be adopted to advance them, worthy of public and private patronage.

10. The introduction of geology into schools, would tend to promote moral improvement among the young. Perhaps there are not two more unfortunate circumstances attending our system of popular education, than that the exercises of children in the school-room are irksome, and those for recreation are dissipating to the mind. If school-houses could be rendered places of pleasant resort, and amusements sources of useful instruction, the great work of reform in cultivating intellectual and moral taste, would be fairly begun. The more innocent and useful amusements are scattered around the young, the less time and disposition will there be to pursue those which are pernicious or useless. No subject, perhaps, is better fitted to answer the double purpose of amusement and instruction, than geology.—

* Mr. Pendleton, of Boston, offers to execute lithographic prints of town maps at a very moderate price, after manuscript drafts are furnished for the purpose. We mention this fact as particularly important to Lyceums.

And few are better fitted to show the power and wisdom of Him, 'who weighed the mountains in scales, and the hills in a balance.'

11. It is easily acquired. The features of this science are not only striking and grand, but they are few and simple, and exactly fitted to entertain and expand the juvenile mind. By the aid of specimens, with appropriate descriptions, its general principles are more easily and readily understood, than those of any other science which is taught. Nothing is more easy than to introduce it into every district and private school in the country; and to acquaint every child with the names, ingredients and uses, of the rocks he daily observes in his walks, and with the prominent geological features of our country.

12. It is necessary. Without it, gazetteers and journals of travels cannot be understood. In some places, a knowledge of the great geological features of the earth, is as common and familiar, as of the continents and oceans: and consequently, without this knowledge, a person is liable to find himself ignorant of the most common and familiar topics of conversation, in the society he will frequently meet. To be destitute of a branch of science so important and accessible, is to be unprovided with a great source of mental occupation and entertainment for early life; and in the case of teachers, the want of it is the want of a powerful and happy means of influencing the youthful mind.

Few teachers perhaps are at present acquainted to any extent with this important department of knowledge. But none need long remain so, who are in the neighbourhood of a Lyceum. The farther extension of this useful instruction will, it is to be hoped, offer opportunities to every instructer, of acquiring at least a good knowledge of local geology.

QUESTIONS on LYCEUM No. 5.

Which communities does experience prove to have the greatest pecuniary prosperity—those who extend a *liberal support* to *literary* and *religious institutions*, or those who withhold it?

Which communities have the best dwellings, farms, roads, &c.—those who expend much, or those who expend little, for churches, school-houses, clergymen and schoolmasters?

Which are most expensive, the solid or the ornamental branches of education?

Which costs the most, a dancing-school for a quarter, or a common district school for four years?

Which get the largest salaries, dancing-masters, or clergymen and teachers of the necessary branches?

What mines are noted for yielding tin?

Which is probably the only metal essential to the arts of civilization?

Which metal is most malleable? How thin can gold leaf be beaten?

What class of bodies are the heaviest, and which the heaviest of the metals?

How much heavier than water is platina?

Which metal is most, and which is least fusible?

Which is most difficult to melt, iron or silver?

What is that property of metals called, which renders them capable of being drawn into wire?

Which metal is most ductile, iron or lead?

Which is the strongest of the metals, and which can be welded and tempered?

What properties in iron fit it for edge tools?

Are the quartz and potash, used in the manufactory of glass, transparent or opaque?

What substances were used before the discovery of glass?

When is glass first mentioned in History?

With which have the Chinese been longest acquainted, glass or porcelain?

Which contains the largest plates of mica, the oldest, or the more recent granite?

What other rocks besides granite contain mica?

How does the arrangement of mica in gneiss differ from that in granite?

If two sets of parallel lines, equally distant, cross each other at right angles, which figure do they form, a square or an oblong?

If two sets of lines, as above, cross at oblique angles, do they form a rhombus or a rhomboid?

Do a square and rhombus differ from each other in their lines or angles?

What is the difference between a rhombus and a rhomboid?

Has an oblong all its sides equal, or only its opposite sides?

Has a rhombus all its angles equal, or only its opposite angles?

Which figure is most common in objects around us, the oblong or square, the square or rhombus?

How far must a child advance in counting, before he can multiply two and divide four?

In what ratio is power increased by bringing levers to act upon each other, arithmetical or geometrical?

What increase of power can be gained by three levers acting upon each other, with the long arm of each ten times as long as the short arm?

Where is the compound lever most useful, in moving a weight a great or a small distance?

Which is most according to the Lyceum principle, for members of a society to instruct each other, or to hire lecturers?

Upon what plan has the Boston Mechanics Lyceum been conducted—lectures, or mutual and familiar exercises?

How many circuit schools can one teacher attend, to advantage?